

Chapter 55

On Design and Development of QLIFEX: An Expert System for Social Area

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ABSTRACT

This article presents an architectural framework of an expert system in the social area domain, and describes the design and the process of development of the expert system. The designed system is intended for the evaluation of quality of life (QL). The development of expert system for quality of life evaluation is a new information technology derived from artificial intelligence research. The new expert system will contain knowledge about sets of factors and indicators, which may be used for quality of life measure, as followings: equal protection by the law; freedom from discrimination; right to be treated equally without regard to gender, race, language, religion, political beliefs, etc. Details of the expert system for quality of life evaluation, its basic modules, design and some implementation details are also explained. The system uses the vast database and the knowledge acquired from social experts. The system is being developed in C Language Integrated Production System CLIPS. The expert system, described in this paper, is called QLIFEX, and it has already been designed so it uses the same knowledge for the following function: to provide expert evaluation for quality of life in the social area. The knowledge for the expert system will be acquired from domain experts, texts and other related sources.

1. INTRODUCTION

In recent years there have been rapid developments in two technologies aimed at improving decision-making: expert systems and decision support systems. While both types seek to improve the quality of the decision, there are some distinct differences between the two technologies. To understand and distinguish them, expert systems and decision support systems could be compared in four primary areas: objectives and intents, operational differences, users, and development methodology.

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The expert systems are problem-solving computer programs that achieve good performance in a specialized problem domain that is considered difficult and requires specialized knowledge and skills. They aim to mimic human reasoning. The methods and the techniques used for building these programs are the outcome of efforts in the field of computer science known as Artificial Intelligence. In conventional computer programs, problem-solving knowledge is encoded in program logic and program-resident data structures. Expert systems differ from conventional programs both in the way problem knowledge is stored and used. An expert system is a program with a set of rules encapsulating knowledge about a particular problem domain. These rules prescribe actions to take when certain conditions hold, and define the effect of the action on deductions or data. The expert system, seemingly, uses reasoning capabilities to reach conclusion. Expert systems that record the knowledge needed to solve a problem as a collection of rules stored in a knowledge-base are called rule-based systems.

Building an expert system requires a close collaboration amongst a great number of actors - the expert, the knowledge engineer, the decision-maker and the user. For each step of the building process, every actor has a precise goal, plays a specific role, and communicates with the others. The strongest relationships are between the knowledge engineer and the expert, or between the knowledge engineer and the decision maker; but a direct link between the user and the expert does not exist.

The expert systems help many industries: Medical diagnosis (Help doctors with treatment advice, Diagnosis of symptoms, Can detect Alzheimer's disease); Medical management (Discern which treatment patient should receive, Administrative decisions); Telephone network maintenance (Diagnose and fix network failures); Credit evaluation (Approve credit card charges, Analyzes credit, Based on financial reports, Used by loan officers); Detection of insider securities trading (Prevent trading of stocks based on private information, Analyze history); Detection of common metals (Identify common metals and alloys, Based on results of chemical tests); Irrigation and pest management (Indicate crop market value, Detect toxins); Diagnosis and prediction of mechanical failure (Diagnose cause of failure).

Expert systems are especially important to organizations that rely on people who possess specialized knowledge of a problem domain, especially if this knowledge and experience cannot be easily transferred. The methods and techniques of artificial intelligence have been applied to a broad range of problems and disciplines which are extremely practical.

A decision support system is an interactive system that helps decision-makers utilizing data and models to solve unstructured or semi-structured problems. On the other hand, a decision support system is a computer program application that analyzes business data and presents it so that users can make business decisions more easily. It is an "informational application" (Zarate, 1991). Typical information that a decision support application might gather and present would be:

- Comparative sales figures between one week and the next;
- Projected revenue figures based on new product sales assumptions;
- The consequences of different decision alternatives, given past experience in a context that is described.

A decision support system may present information graphically. It may be aimed at business executives or some other group of knowledge workers.

The decision support systems are used in many industries: Food production and retailing (Forecast number of patrons, Amount of ingredients to purchase); Agriculture (Farmers make decisions controlling pests, Picking farm locations); Tax planning (Tax helper applications are decision support systems);

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